Social Influence in Stockmarkets

A Conceptual Analysis of Social Influence Processes in Stock Markets

Anders Biel
Maria Andersson
Martin Hedesström
Magnus Jansson
Eva-Lotta Sundblad
Tommy Gärling

Department of Psychology
University of Gothenburg
Gothenburg
Sweden

SIRP WP 10-13

Sustainable Investment and Corporate Governance Working Papers,

Sustainable Investment Research Platform

FUNDED BY MISTRA sirp.se Sustainable Investment Research Platform

Social Influence in Stockmarkets

A Conceptual Analysis of Social Influence Processes in Stock Markets

Anders Biel*
Maria Andersson
Martin Hedesström
Magnus Jansson
Eva-Lotta Sundblad
Tommy Gärling

Department of Psychology
University of Gothenburg
Gothenburg
Sweden

* Corresponding author email: anders.biel@psy.gu.se

Abstract

As widely recognized, human mankind stands before the most challenging problem of preventing anthropogenic climate change. As a response to this, the European Union advocates an ambitious climate policy mix. However, there is no consensus concerning the impact of stringent environmental policy on firms' competitiveness and profitability. From the traditional 'static' point of view there are productivity losses to be expected. On the other hand, the so called Porter hypothesis suggests the opposite; i.e., due to 'dynamic' effects, ambitious climate and energy policies within the EU could actually be beneficial to firms in terms of enhanced profitability and competitiveness. Based on Sweden's manufacturing industry, our main purpose is to specifically assess the impact of the CO2 tax scheme of Sweden on firms' profit efficiency. The empirical methodology is based on stochastic frontier estimations and, in general, the results suggest we can neither reject nor confirm the Porter hypothesis across industry sectors. Therefore, we do not generally confirm the argument of stringent environmental policies having positive dynamic effects that potentially offset costs related to environmental policy.

Keywords: Social influence, stock investments, conceptual analysis

The authors gratefully acknowledge financial support from the Foundation for Strategic Environmental Research (MISTRA) through the Sustainable Investment Research Platform (SIRP).

According to the traditional economic view, investors are exemplars of "homo economicus," an antisocial species interacting with others only for the benefits of gaining valuable information. Thus, investors in stock markets should not be influenced by others unless it is rational to be so. In contrast, homo sapiens (a species which we are certain stock investors belong to) are frequently influenced by other humans. This social influence may be beneficial in improving judgments and decisions. However, sometimes social influence occurs when it is not beneficial.

Current research on herding in stock markets is primarily conducted by economists. Although references are occasionally made to social-psychological research (e.g. Asch, 1952; 1956), the aim of the research is primarily to show that herding actually exists, and if it exists, that it is rational and thus possible to reconcile with rational choice theory (efficient market theory) in economics (e.g. Bikhchandani & Sharma, 2000; Devenow & Welch, 1996). The aim of the present paper is to propose that various types of social influence are underlying herding in stock markets and that some of these types follow the regularities social-psychological theories of social influence attempt to explain. In the next section we briefly describe anomalies in stock markets. A discussion of different types of social influence in stock markets follows. We then review the research on herding. A final section presents our conclusions and charts directions for future research.

Anomalies in Stock Markets

In stock markets investors trade stock shares. Why do they trade? A rational analysis suggests that investors only trade if they differ from each other, for instance in liquidity needs, risk perception or attitude, or knowledge (Glaser, Nött, & Weber, 2004). These differences are however not sufficient to explain the observed high trading volumes (Odean, 1999). A reason may be that stock prices are too low or too high. According to efficient market theory (EMT) proposed in financial economics (Fama, 1970), if the trading prices of stocks deviate from their fundamental value due to "noise" traders, it will increase trading by rational investors whose trading eventually will correct the prices. However, empirical observations questioning the validity of EMT indicate that rational investors' ability is limited in nullifying the impact of noise traders (DeBondt, 2008; Shleifer & Vishny, 1997). Possible reasons are lack of mispriced, fully substitutable stocks to purchase, uncertainty about fundamental stock values, and, as a consequence, uncertainty about whether price trends will continue. Rational investors may for this reason even follow noise traders in buying "glamour" stocks with increasing price trends, thereby reinforcing rather than counteracting the price trends.

Anomalies (deviations from EMT) are causes of booms that become bubbles and eventually, in uncontrolled ways, lead to busts or crashes. It is estimated that 13 stock market crashes occurred between 1800 and 1940 including the "Great Crash" of 1929 (Galbraith, 1955/1997). In many people´s vivid memory is the unprecedented bull market 1982-1987 when nobody anticipated what in 1987 became a crash, or the dot.com boom/bubble ending with a crash in 1999. Explanations of stock market crashes tend to focus on the crash itself. However, what needs to be explained is why a boom that is sensible given economic upswings becomes a bubble (Rapp, 2009). Many observers (Akerlof & Shiller, 2008; Krugman, 2009) ascribe an important role to psychological factors. In Gärling et al. (2010) several anomalies are identified, including overreaction to news (Andreasson, 1990; Schachter, Hood, Andreasson, & Gerin, 1986), the disposition effect (Shefrin & Statman, 1985), reactions to splits of stock shares (Svedsäter, Gamble, & Gärling, 2007), and naïve risk diversification (Hedeström, Svedsäter, & Gärling, 2006). Other anomalies have also been noted (e.g. DeBondt, 2008).

Explanations have primarily included well-known cognitive biases such as overconfidence, conservatism, optimism bias, money illusion, asymmetric risk attitudes, framing, loss aversion, biased information search, mental accounting, diversification heuristic, and co-variation neglect (Koehler & Harvey, 2007). Some of the cognitive biases are furthermore exaggerated by affective influences on investors (Zaleskiewicz, 2008).

Cognitive biases, whether exaggerated by affective influences or not, are probably necessary but not sufficient explanations of why booms in stock markets become bubbles. In Figure 1 we highlight additional, and presumably substantial, effects of social factors. Individual investors who judge financial risks and make decisions to buy and sell stocks are guided by societal, organizational and personal values. As has been shown in previous research (Fontaine, Poortinga, Delbeke, & Schwartz, 2008; Schwartz, 1992), value priorities range from self-interest (self-enhancement) to collective interest (self-transcendence). In general self-interest is likely to be a dominant guiding principle although sometimes overriden by fairness (Fehr & Schmitt, 1999; Rabin, 1993). Investors who are employed by financial institutions are largely influenced by their employers' value priorities, even though these differ from their personal value priorities (Nilsson, von Borgstede, & Biel, 2004). As exemplified by research on socially responsible investments (SRI, Jansson & Biel, 2010), societal value priorities emphasizing long-term sustainability are particularly difficult to implement in a financial industry so much influenced by short-term profits. A decision to incorporate SRI in fund management does not seem to be guided by environmental and social values. Rather, the decisive factor is a positive attitude towards SRI, supported by beliefs about positive short-term returns.

An important question to be analyzed further in the next sections is the extent to which and how different types of social influence play roles in the investment process. Clearly, there are both informal and formal ways. Internal agencies, in particular trustees and top and middle management, are responsible for defining the organizational culture or informal aspects of the decision making structure. To the extent that values are widely shared among members of an organization, an organizational culture may exist that in turn form the basis for expectations about proper norms and behaviour (O'Reilly, Chatman, & Caldwell, 1991). As mentioned above, in the case of SRI informal aspects do not guide the investment process. Formal aspects are also set by external decision making agencies such as consultants, rating agencies, index providers, and regulators. In the domain of SRI, sustainability ratings currently available are better suited to single out worst-performers than to identify best-performers (Hedesström, Lundqvist, & Biel, in press). Moreover, ratings have been shown to vary considerably across analyst organizations. Granted that uncertainty prevails concerning positive sustainable investment opportunities, investors may interpret the behaviour of others as an indicator of suitable investment alternatives.

Types of Social Influence in Stock Markets

If some investors in stock markets start to buy stocks in a given company or industry sector, other investors may follow them and buy the same stocks – a phenomenon referred to as herding. Sias (2004) accordingly defines herding as investors' tendency to follow each other in buying and selling the same stocks. He further notes that herding exists both for individual and institutional investors. Still, observations of market behavior do not permit strong inferences about the causes of herding. Although social influence is the common denominator, several types of social influence are conceivable as will be discussed below with reference to Figure 2.

Although implied by the definition that herding is equivalent to imitating others, social influence by others may also be *indirect*. Four main causes of indirect social influences have been proposed in previous research: common knowledge, fads, common investment strategies, and similar compensation schemes. Common knowledge has an influence when investors, independently of each other, use the same information (Froot, Scharfstein, & Stein, 1992; Grinblatt, Titman, & Wermers, 1995). Evidence of fads is that investors buy the same popular stocks (Sias, 2004). Many investors may also systematically follow the same investment strategy (Wermers, 2000). To this should be added that cognitive biases are the same for many investors, thus would have the same influence as following the same investment strategy has. Investment firms' schemes for compensating their employed investors frequently reward performance relative to that of others, and therefore the investors may earn less if deviating from a market index (Rajan, 1994).

Herding due to *direct* influences from other investors is believed to arise from "information cascades" where investors, independently of their private information, use the observations of choices made by others preceding them to make the same choice (Bikchandani, Hirshleifer, & Welch, 1992), or "reputational herding" referring to that choices that deviate from others' choices impose costs for investors in terms of an impaired reputation (Scharfstein & Stein, 1990). The possible causes of herding are not mutually exclusive. Thus, investors may herd for several reasons at the same time.

Review of Research on Herding in Stock Markets

The issues addressed by research are whether herding exists, whether herding is rational or irrational, and what causes herding. On the first issue no definite consensus have been reached in research based on analyses of investor behavior in stock markets (see review by Hirshleifer & Teoh, 2003). While some studies confirm the existence of herding (e.g., Guedj & Bouchaud, 2005; Sias, 2004), others do not (e.g., Drehmann, Oechssler, & Roider, 2005; Grinblatt et al. 1995; Lakonishok, Shleifer, & Vishny, 1992; Wermers, 1999). The different results are partly explained by how herding has been measured. One common measure developed by Lakonishok et al. (1992) assumes that large imbalances between the number of buyers and sellers in stocks are evidence of herding. Studies applying this measure (Grinblatt et al. 1995; Wermers, 1999) show a lower level of herding compared to studies applying other measures (Bennett, Sias, & Starks, 2003; Nofsinger & Sias, 1999).

Experiments (e.g., Anderson & Holt, 1997; Celen & Kariv, 2004) show more clearly that information that others' actions provide is utilized. Whether this is rational or not is debated. One argument for rationality is that others' actions convey useful information, either because the others have more knowledge or simply because they are members of a crowd. The "wisdom of the crowd" (Surowiecki, 2004) refers to the statistical fact that under conditions of independent random sampling, an aggregate collective judgment is more accurate than individual judgments. An empirical illustration is an experiment by Treynor (1987) in which participants made independent judgments of the number of jelly beans in a jar. The jar had 850 jelly beans. The aggregate group estimate was 871, and only one of the 56 participants made a better judgment. Thus, as would be expected, a combined judgment by a group outperforms the average individual (Larrick & Soll, 2006). In order to characterize a crowd as "wise," each person in the crowd must possess unbiased independent information and each judgment must be made independently. If the individual judgments are aggregated by giving each equal weight, then unsystematic errors will cancel. In a similar vein, independent unbiased judgments by investors would yield stock prices close to their fundamental values. It is also important to realize that accuracy of aggregated judgments will increase with group

size (although at a decelerating rate). Imagine that only three people participated in the jelly-bean experiment. Adding a fourth would obviously have a large influence on the aggregated judgment. In contrast, the judgment by another participant would have little influence on the aggregated judgment by an already large group.

Information cascades start in stock markets when investors ignore their private information and imitate others (Smith & Sørensen, 2000). An everyday illustration of an information cascade is given by Shillller (2000). Imagine that a person chooses between two unfamiliar, apparently similar restaurants situated on each side of a street. The person has received mixed reviews by others about one of the restaurants (A) and good reviews about the other (B). When approaching the restaurants, the person notes that restaurant A is more crowded than restaurant B. For this reason he or she ignores the private information about the reviews and choose the same restaurants as the others.

In a typical experiment investigating information cascades (e. g. Anderson & Holt, 1997), participants' task is to predict which of two events (*A* or *B*) would take place. On each trial participants receive a cue (*a* or *b*) followed by the events *A* and *B* with a predetermined probability. The cue is private but the prediction is publicly announced, thus participants on each trial receive information about the private cue and the decisions made by the preceding participants. An information cascade occurs when a participant observes two consecutive choices (*A*, *A*) and, despite contrary private information (*b*), chooses the same option as the others have chosen (*A*). Anderson and Holt (1997) found that cascades are formed when the initial decisions coincide, and they concluded that following the established pattern in such cases is consistent with normative reasoning (Bayes' rule), that is that beliefs are revised by optimal use of diagnostic information. However, they also found that in about half of the cases when a cascade was observed, participants' choices were inconsistent with Bayes' rule and were thus interpreted as irrational.

In experiments demonstrating information cascade the price of a stock share does not change with demand. Avery and Zemsky (1998) argued that if stocks with market-determined prices are chosen, information cascades cannot start. Counter-arguments were presented by Chari and Koehe (2004) and Sgroi (2003). Doubts about rationality of information cascades are furthermore raised by Spiwoks, Bizer, and Hein (2008) who report that only 36% of the decisions made by the participants were consistent with Bayes' rule and that only a minority of them was able to state a correct reason for their decisions.

Herding in stock markets may be explained by psychological principles of *social influence*. Festinger's (1954) theory of social comparison processes and the pioneering experiments by Sherif (1935) and Asch (1956) started a tradition of social-influence research. In this research it is presumed that people in many areas of social life are influenced by others when making decisions. Such social influence is *normative* or *informative* (Deutsch & Gerard, 1955). In the former case the motive is to conform to others due to external social pressure or internalized norms, whereas in the latter case the motive is to acquire useful information from others. According to Shiller (2000) both types exist in stock markets, informative social influence because given the uncertainty investors face, they are likely to use many sources of information including information about others' behavior, and normative social influence because investors frequently are agents investing money owned by others and therefore accountable to them.

Several theories of social influence have been proposed. One is Moscovici's (1985) theory positing that different cognitive and motivational processes account for majority and minority influences. Briefly, a majority is assumed to trigger a comparison process leading to people complying with the majority without thoroughly reflecting on its message. Since people are unwilling to be identified with deviant groups, minorities are instead assumed to trigger a validation process leading to that the minority members' arguments are critically evaluated. Another reason for majority influences, consistent with that social influences are informative, is that people who are uncertain about how to act use a "consensus" heuristic implying that the majority is correct (Eagly & Chaiken, 1993; Martin, Gardikiotis, & Hewstone, 2002). Conversely, a minority would not be trusted since it cannot be correct if the majority is. The consensus heuristic is sensible but would lead to errors if over-generalized. A consequence is that herding is rational or irrational depending on the circumstances. An important factor is the ease with which accuracy of performance can be determined. In stock markets this is generally difficult (Taleb, 2004).

Andersson (2009) and Andersson, Hedesström, and Gärling (2009) reported a series of experiments in which undergraduates were asked to make predictions of changes in fictitious stock prices that were both systematic and unsystematic. Consistent with the results of research on probabilistic inference (Cooksey, 1996), the influence on the predictions of the current stock price increased when the systematic component of the changes in stock prices increased. For instance, an opening price of a stock that correlated with the closing price the same day was frequently used to predict the latter. When others (ostensibly consisting of five other participants) made predictions of the stock price that were disclosed to the participants, their predictions had a large influence if they were a consistent majority (four of the others making correlated predictions), but not if they were a consistent minority (two of the others making correlated predictions). Whether the majority made accurate or random predictions did not change its influence. Yet, if the price varied systematically so that it could be utilized to predict the stock price, majority influences tended to be reduced.

An implication is that in times of excessive uncertainty (high volatility of stock prices), the tendency to follow others would be the strongest. Trends of falling or rising prices are therefore likely to be boosted. This starts a vicious circle. The causes of herding are under such circumstances probably multiple and not easy to identify. Obviously, common knowledge must be discounted as a cause when uncertainty is excessive. A possibly dominant cause under these circumstances is to avoid becoming a sucker (Dawes, 1999). As Keynes (1936/1997) noted, worldly wisdom teaches that it is better for one's reputation to fail conventionally than to succeed unconventionally. It is likewise argued that investors who herd are able to share the blame and hide in the herd when making unsuccessful investment decisions (Devenow & Welch, 1996). Along the same lines, Scharfstein and Stein (1990) proposed that an unprofitable investment harms a decision maker considerably less when others have made similar investments, which constitutes a reputational reason for investors to ignore private information in favour of trading with the herd. Parallel to this explanation is Palley's (1995) argument that herding is based on the principle of "safety in numbers," assuming that managers are individually risk averse, and that their reward is partly based on relative performance.

Empirical results are consistent with the notion that concern about reputation causes herding. Thus, younger portfolio managers deviate less from consensus than their older colleagues, possibly because they have more at stake in terms of reputation as they face a longer working life ahead (Hong, Kubik, & Solomon, 2000). Experiments with professional stock analysts

have also demonstrated reputational herding. In one study (Cote & Sanders, 1997) participants' task was to predict future returns. After each prediction the average prediction was shown to the participants, giving them an opportunity to adjust their own predictions. The results showed that presenting the average prediction had a significant influence, and that the degree of influence was related to the participants' perceptions of their own ability and motivation to create or maintain a good reputation.

Investors in stock markets have been described as mindless sheep blindly following the herd, being frantic during market booms and terrified during market crashes (Shiller, 2000). Although the evidence from research on herding in stock markets hardly justifies the sheep metaphor, herding is likely to reinforce the cognitive biases and affective influences to which investors in stock markets are susceptible. In doing so herding will aggravate stock price volatility that de-stabilizes the market (Bikchandani & Sharma, 2000; Chari & Koebe, 2004).

Summary, Conclusions, and Future Research Directions

It is argued that social factors play an important role for booms-bubbles-busts cycles in stock markets. Specifically, indirect and direct social influences may reinforce stock investors' cognitive biases, exaggerated by affective influences. A review of research primarily undertaken by financial economists analyzing market data documents the prevalence of herding in stock markets. Additional research is still needed to show that imitating others is a possible mediating mechanism. Theories of social influence proposed in psychology contribute by focusing on different processes accounting for the observation that majority has stronger influence than minorities. Other psychological research in psychology (e.g. Biel, Eek, Gärling, & Gustafsson, 2008) is consistent with that investors are concerned about their reputation and for this reason consider it to be in their interest to not make different decisions than a majority (which in this psychological research is referred to as "common fate"). The conclusion is warranted that psychological research is highly relevant and in the following paragraphs we highlight several directions that this research can take.

In line with the notion of two different information-processing systems (such as heuristic and systematic) (Eagly & Chaiken, 1993; Petty & Cacioppo, 1986; but see recent criticism by Keren & Schul, 2009), it has been proposed that herding occurs as a result of either unconscious and instinctive responses or deliberate thoughts (Baddeley, 2010). Martin, Hewstone, and Martin (2008) take a different approach by considering that influences from majorities or minorities instigate different amounts of processing effort. In the research on stock price predictions by Andersson (2009) and Andersson et al. (2009), low processing effort is interpreted as heuristic processing and high processing effort as systematic processing. The different types of processing are primarily operationalized as the tendency to follow a majority herd making random predictions (heuristic processing) and as the tendency to use a processing strategy that improves performance (systematic processing) by taking accuracy into account. Future research needs to disentangle whether the different types of processing can be equated with different amounts of processing effort and whether this sometimes is due to deliberate meta-decisions (Payne, Bettman, & Johnson, 1993). These issues seem particularly important with regard to informational social influence. An example is when people after thorough elaboration evaluates the available information as incomplete and therefore decides to rely on a consensus heuristic. In this case the decision to use a heuristic is in fact the result of systematic processing. That fast decisions allowing less information processing are frequently required (in a stock market) is an additional factor to take into account.

In line with the theoretical suggestions by Prechter and Parker (2007), empirical findings have underlined the role of heuristic processing in herding. As noted, Andersson (2009) investigated the prevalence of use of the "consensus" heuristic. Also, it was argued that not following a minority may actually result from a converse consensus heuristic (to not follow the minority because it is always wrong). Quiamzade and L'Huillier (2009) found that people herd with others who have made unexpected investments, believing that these others possess privileged information. This belief was found to be a more prevalent explanation for herding than information about whether the others held professional investment positions. Thus, by arguing that attribution of superior information relates to the perception of expertise, people herd due to the use of a "heuristic about competence". Thus, there are several propositions about an association between herding and heuristic processing. A topic for future research is to specify which heuristics are used under which conditions.

Even though it is known that people may herd for different reasons, previous research on does not distinguish among different types of social influences. For example, informational social influence may be connected to reputational concerns, which is more closely related to normative social influences that also exist in financial markets (Shiller, 2000). Additional research is needed in order to identify different determinants of herding for the understanding of investors' investment decisions. A complication that must be taken into account is that is that several determinants are likely to co-exist.

Neuroscience methods may turn out to be a useful alternative approach to distinguishing between processes underlying herding. Some empirical results support that a decision to follow the herd has shorter decision times (Baddeley, Pillas, Christopoulos, Schultz, & Tobler, 2007). This is interpreted as a connection between herding and an automated decision-making heuristic. The interpretation bears similarities to functional magnetic resonance imaging (fMRI) evidence in Asch-type tasks (Berns, Chappelow, Zink, Pagnoni, Martin-Skurski, & Richards, 2005). If the processes underlying herding can be better understood by brain organization and function, such attempts should be strongly encouraged.

It may finally be concluded that it is important to emphasize that in psychology the same sharp distinction is not made between "rational" and "irrational" herding in stock markets as in the economic research (Baddeley, 2010). Such a sharp distinction would leave a limited role for psychological explanations. Apparently, theories of social influence go beyond an account of herding as rational when it improves investment decisions and irrational when it biases investment decisions. An extended interdisciplinary approach to herding deepens the understanding by including interactions between different decision-making processes.

References

Akerlof, G. A., & Shiller, R. J. (2008). *Animal spirits*. Princeton, NJ: Princeton University.

Anderson, L. R., & Holt, C. A. (1997). Information cascades in the laboratory. *American Economic Review*, *87,* 847-862.

Andersson, M. (2009). *Social influence in stock markets: Effects of valid price information and expertise*. Manuscript submitted for publication.

Andersson, M., Hedesström, T. M., & Gärling, T. (2009). *Processes mediating majority and minority herd influences on predictions of simulated stock prices*. Manuscript submitted for publication.

Andreasson, P. A. (1990). Judgmental extrapolation and market overreaction: On the use and disuse of news. *Journal of Behavioral Decision Making*, *3*, 153-174.

Asch, S. E. (1952). *Social psychology*. Prentice-Hall: New Jersey.

Asch, S. E. (1956). Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs, 70*, Whole No. 416.

Avery, C. & Zemsky, P. (1998). Multi-dimensional uncertainty and herd behaviour in financial markets. *American Economic Review, 88*, 724-748.

Baddeley, M. (2010). Herding, social influence and economic decision-making: Socio-psychological and neuroscientific analyses. *Philosophical Transactions of the Royal Society B, 365*, 281-290.

Baddeley, M., Pillas, D., Christopoulos, G., Schultz, W. & Tobler, P. (2007). *Herding and social pressure in trading tasks: A behavioural analysis* (Working Papers in Economics CWPE no. 0730). Cambridge, UK: University of Cambridge, Faculty of Economics.

Bennett, J., Sias, R., & Starks, L. (2003). Greener pastures and the impact of dynamic institutional preferences. *Review of Financial Studies, 16*, 1203-1238.

Berns, G., Chappelow, J., Zink, C., Pagnoni, G., Martin-Skurski, M. & Richards, J. (2005). Neurobiological correlates of social conformity and independence during mental rotation. *Biological Psychiatry, 58*, 245–253.

Biel, A., Eek, D., Gärling, T., & Gustafsson, M. (Eds.). (2008). *New issues and paradigms in research on social dilemmas*. New York: Springer.

Bikchandani, S., & Sharma, S. (2000). Herd behavior in financial markets. *IMF Staff Papers, 47*, 279-310.

Bikchandani, S., Hirshleifer, D., & Welch, I. (1992). A theory of fads, fashion, custom and cultural change as informational cascades. *Journal of Political Economy, 100*, 992-1026.

Celen, B., & Kariv, S. (2004). Distinguishing informational cascades from herd behaviour in the laboratory. *American Economic Review, 94*, 484-498.

Chari, V. V., & Koehe, P. J. (2004). Financial crises as herds: Overturning the critiques. *Journal of Economic Theory, 119*, 128-150.

Cooksey, R. W. (1996). *Judgment analysis: Theory, methods, and applications*. San Diego, CA: Academic.

Cote, I., & Sanders, D. (1997). Herding behavior: Explanations and implications. *Behavioral Research and Accounting, 9*, 20-45.

Dawes, R. M. (1999). Experimental demand, clear incentives, both, or neither? In D. V. Budescu, I. Erev & R. Zwick, R. (Eds.) (1999). *Games and human behaviour* (pp. 21-28). Mahwah, NJ: Erlbaum.

DeBondt, W. F. M. (2008). Stock prices: Insights from behavioral finance. In A. Lewis (Ed.), *The Cambridge handbook of psychology and economic behaviour* (pp. 64-104). Cambridge. Cambridge University Press.

Deutsch, M., & Gerard, H.G. (1955). A study of normative and informational social influence upon individual judgment. *Journal of Abnormal and Social Psychology, 51*, 629-636.

Devenow, A., & Welch, I. (1996). Rational herding in financial economics. *European Economic Review, 40*, 603-615.
Drehmann, M., Oechssler, J., & Roider, S. (2005). Herding and contrarian behavior in financial markets: An internet experiment. *American Economic Review*, *95*, 1403-1426.
Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth, TX: Harcourt Brace Jovanovich.
Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, *25*, 383-417.
Fehr, E., & Schmidt, K. M. (1999). A Theory Of Fairness, Competition, And Cooperation. *Quarterly Journal f Economics, 114*, 817-868.
Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117-140.
Fontaine, J., Poortinga, H., Delbeke, L., & Schwartz, S. H. (2008). Structural equivalence of the values domain across cultures: Distinguishing sampling fluctuations from meaningful variation. *Journal of Cross-Cultural Psychology*, *39*, 345–365.
Froot, K., Scharfstein, D., & Stein, J. C. (1992). Herd on the street: Informational inefficiencies in a market with short-term speculation. *Journal of Finance, 47,* 1461-1484.
Galbraith, J. K. (1955/1997). *The great crash: 1929*. New York: Houghton Mifflin.
Gärling, T., Kirchler, E., Lewis, A., & van Raiij, F. (2010). Psychology, financial decision making, and economic crises. *Psychological Science in the Public Interest*.
Glaser, M., Nöth, M., & Weber, M. (2004). Behavioral finance. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment & decision making* (pp. 527-546). Oxford: Blackwell.
Grinblatt, M., Titman, S., & Wermers, R. (1995). Momentum investment strategies, portfolio performance, and herding: A study of mutual fund behavior. *American Economic Review, 85,* 1088-1105.
Guedj, O., & Bouchaud, J. P. (2005). Experts' earning forecasts: Bias, herding and gossamer information. *International Journal of Theoretical and Applied Finance, 8*, 933-946.
Hedesström, M., Lundqvist, U., & Biel, A. (in press). Investigating consistency of judgement across sustainability analyst organizations. *Sustainable Development*.
Hedesström, T. M., Svedsäter, H., & Gärling, T. (2006). Covariation neglect among novice investors. *Journal of Experimental Psychology: Applied, 12,* 155-165.
Hirshleifer, D., & Teoh, S. H. (2003). Herd behaviour and cascading in capital markets: A review and synthesis. *European Financial Management, 9*, 25-66.
Hong, H. G., Kubik, J., & Solomon, A. (2000). "Security analysts" career concerns and herding of earning forecasts. *RAND Journal of Economics, 31*, 121-144.
Jansson, M., & Biel, A. (2010). *Investment institutions' beliefs about and attitudes toward socially responsible investment (SRI): A comparison between SRI and non-SRI management*. Manuscript submitted for publication.
Keynes, J. M. (1936/1997). *The general theory of employment, interest and money*. London: Harcourt Brace.
Keren, G., & Schul, Y. (2009). Two is not always better than one: A critical evaluation of two-system theories. *Perspectives on Psychological Sciences, 4*, 533-550.
Koehler, D. J., & Harvey, N. (Eds.) (2007). *Blackwell handbook of judgment and decision making*. Oxford: Blackwell.
Krugman, P. (2009). *The return of depression economics and the crisis of 2008*. London: Nortons.
Lakonishok, J., Shleifer, A., & Vishny, R. W. (1992). The impact of institutional trading on stock prices. *Journal of Financial Economics, 32,* 23-24.

Larrick, R. P., & Soll, J. B. (2006). Intuitions about combining opinions: Misappreciation of the averaging principle. *Management Science, 52*, 111-127.
Martin, R., Gardikiotis, A., & Hewstone, M. (2002). Levels of consensus and majority and minority influence. *European Journal of Social Psychology, 32*, 645-665.
Martin, R., Hewstone, M., & Martin, P. Y. (2008). Majority versus minority influence: the role of message processing in determining resistance to counter-persuasion. *European Journal of Social Psychology, 38*, 16-34.
Moscovici, S. (1985). Social influence and conformity. In G. Lindsey & E. Aronson (Eds.), *Handbook of social psychology* (Vol. 2, 3rd ed., pp. 347-412). New York: Random House.
Nilsson, A., von Borgstede, C., & Biel, A (2004). Willingness to accept climate change strategies: The effect of values and norms. *Journal of Environmental Psychology, 24*, 267-277.
Nofsinger, J. R., & Sias, R. W. (1999). Herding and feedback trading by institutional and individual investors. *Journal of Finance, 54*, 2263-2295.
Odean, T. (1999). Do investors trade too much? *American Economic Review*, *89*, 103-124.
O'Reilly, C. A., Chatman, J., & Caldwell, D. F. (1991). People and organizational culture: A profile comparison approach to assessing person-organization fit. *Academy of Management Journal, 34*, 487-516.
Palley, T. I. (1995). Safety in numbers: A model of managerial herd behavior. *Journal of Economic Behavior and Organization, 3*, 443-450.
Payne, J. W., Bettman, J. R., Johnson, E. J. (1993). *The adaptive decision maker*. New York: Cambridge University Press.
Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change.* New York: Springer-Verlag.
Prechter, R. R., & Paker, W. D. (2007). The financial/economic dichotomy in social behavioral dynamics: The socionomic perspective. *Journal of Behavioral Finance, 8*, 84-108.
Quiamzade, J-P., & L'Huillier, J-P. (2009). Herding by attribution of privileged information. *Journal of Behavioral Decision Making, 22*, 1-19.
Rabin, M. (1993). Incorporating fairness into game theory and economics. *The American Economic Review, 83*, 1281-1302.
Rajan, R. G. (1994). Why bank credit policies fluctuate: A theory and some evidence. *Quarterly Journal of Economics, 109*, 399-441.
Rapp, D. (2009). Bubbles, booms, and busts: The rise and fall of financial assets. New York: Springer.
Schachter, S., Hood, D. C., Andreasson, P. A., & Gerin, W. (1986). Aggregate variables in psychology and economics: Dependence and the stock market. In B. Gilad & S. Kaish (Eds.), *Handbook of behavioral economics* (Vol. 3, pp. 237–272). London: Greenwich.
Scharfstein, D. S., & Stein, J. C. (1990). Herd behavior and investment. *American Economic Review, 80*, 465-479.
Schwartz. S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 24, pp. 1–65). San Diego: Academic Press.
Sgroi, D. (2003). The right choice at the right time: A herding experiment in endogenous time. *Experimental Economics, 6*, 159-180.
Shefrin, H., & Statman, M. (1986). The disposition to sell winners too early and ride losers too long: Theory and evidence. *The Journal of Finance, 40*, 777-790.
Sherif, C. W. (1935). A study of some social factors in perception. *Archives of Psychology*, *22*, No. 187.

Shiller, R. J. (2000). *Irrational exuberance*. Princeton, NJ: Princeton University Press.
Shleifer, A., & Vishny, R. The limits of arbitrage. *Journal of Finance, 52*, 35-55.
Sias, R. W. (2004). Institutional herding. *Review of Financial Studies, 17*, 165-206.
Smith, L., & Sørensen, P. (2000). Pathological outcomes of observational learning. *Econometrica, 68*, 371-398.
Spiwoks, M., Bizer, K., & Hein, O. (2008). Informational cascades: A mirage? *Journal of Economic Behavior & Organization, 67*, 193-199.
Surowiecki, J. (2004). *The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations*. London: Little Brown.
Svedsäter, H., Gamble, A., & Gärling, T. (2007). Money illusion in intuitive financial judgments: Influences of nominal representation of share prices. *Journal of Socio-Economics*, *36*, 698-712.
Taleb, N. N. (2004). *Fooled by randomness: The hidden role of chance in life and the markets.* New York: Random House.
Treynor, J. L. (1987). Market efficiency and the bean jar experiment. *Financial Analysts Journal, 43*, 50-53.
Wermers, R. (1999). Mutual fund herding and the impact on stock prices. *Journal of Finance, 54*, 581-622.
Wermers, R. (2000). Mutual fund performance: An empirical decomposition into stock picking talent, style, transaction costs, and expenses. *Journal of Finance, 55,* 1655-1695.
Zaleskiewicz, T. (2008). Behavioral finance. In M. Altman (Ed.), *Handbook of contemporary behavioral economics* (pp. 707-728). Armonk, NY: Sharpe.

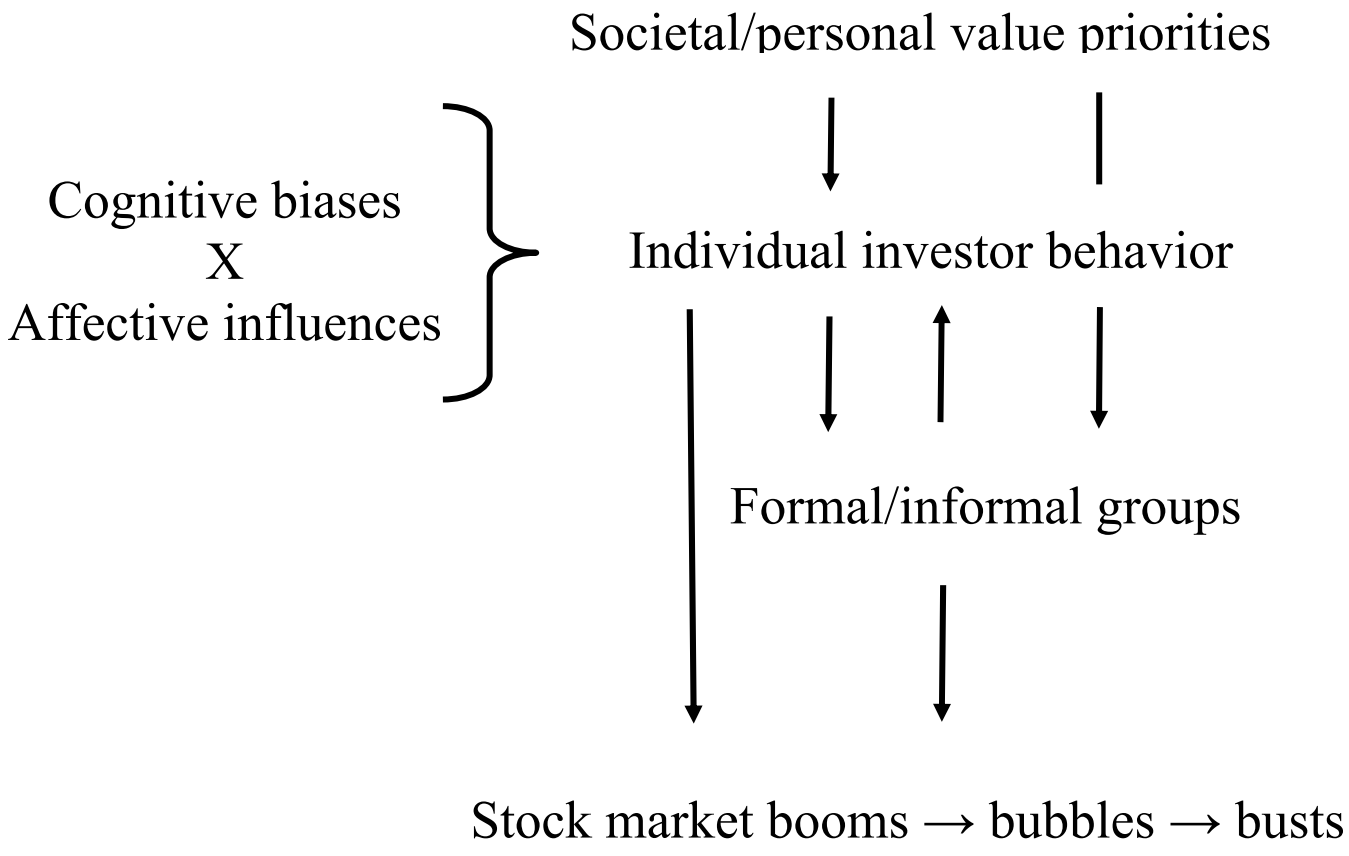

Figure 1. Possible psychological determinants of stock market booms, bubbles, and busts.

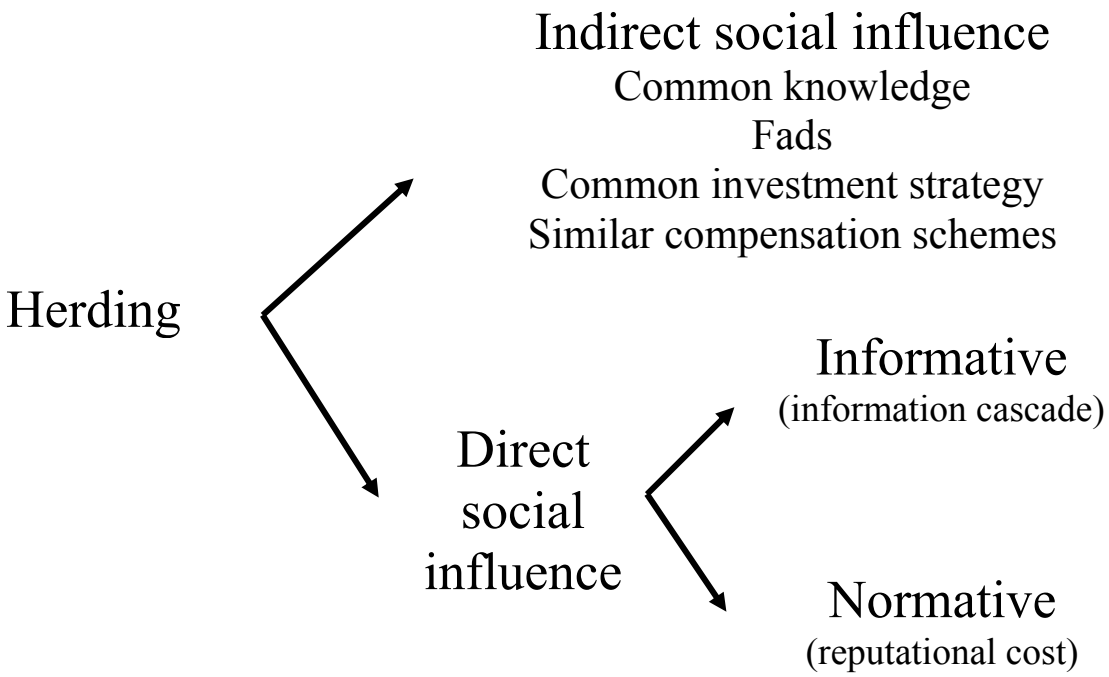

Figure 2. A categorization of social influence in stock markets.